

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claim 1. (Canceled)

2. (Currently amended) ~~The~~An internal combustion engine cooling system according to claim 1 comprising:

a radiator that receives cooling water from an internal combustion engine, cools the cooling water and returns cooled cooling water into the internal combustion engine;
a coolant passage connecting the internal combustion engine and the radiator,
and including an inlet passage through which the cooling water flows from the internal combustion engine into the radiator, and an outlet passage through which the cooling water flows from the radiator into the internal combustion engine;

a bypass passage connecting the inlet passage and the outlet passage to make the cooling water discharged from the internal combustion engine bypass the radiator;

a flow control valve placed at a junction of the outlet passage and the bypass passage to control radiator flow rate at which the cooling water flows through the radiator and bypass flow rate at which the cooling water flows through the bypass passage;

a water pump placed in the inlet or the outlet passage to circulate the cooling water through the internal combustion engine and the radiator;

a desired coolant temperature setting means for setting a normal desired coolant temperature of the cooling water flowing through the outlet passage; and

a coolant temperature control means for controlling temperature of the cooling water flowing through the outlet passage on the basis of the desired coolant temperature set by the desired coolant temperature setting means,

wherein the desired coolant temperature setting means changes the desired coolant temperature according to operating condition of the internal combustion engine,

traveling condition of a vehicle mounted with the internal combustion engine, and ambient condition, and

wherein the desired coolant temperature setting means sets a desired coolant temperature for an uphill traveling mode differently from the normal desired coolant temperature when the vehicle is traveling in the uphill traveling mode, and sets a desired coolant ~~temperature, temperature~~ for a downhill traveling mode differently from the normal desired coolant temperature when the vehicle is traveling in the downhill traveling mode.

3. (Original) The internal combustion engine cooling system according to claim 2, wherein the desired coolant temperature setting means sets the desired coolant temperature to be lower than the normal desired coolant temperature when the vehicle is traveling in the uphill traveling mode.

4. (Original) The internal combustion engine cooling system according to claim 2, wherein the desired coolant temperature setting means sets the desired coolant temperature to be higher than the normal desired coolant temperature when the vehicle is traveling in the downhill traveling mode.

5. (Currently amended) ~~The~~ An internal combustion engine cooling system according to ~~claim 1~~ comprising:

a radiator that receives cooling water from an internal combustion engine, cools the cooling water and returns cooled cooling water into the internal combustion engine;
a coolant passage connecting the internal combustion engine and the radiator,
and including an inlet passage through which the cooling water flows from the internal combustion engine into the radiator, and an outlet passage through which the cooling water flows from the radiator into the internal combustion engine;

a bypass passage connecting the inlet passage and the outlet passage to make the cooling water discharged from the internal combustion engine bypass the radiator;

a flow control valve placed at a junction of the outlet passage and the bypass passage to control radiator flow rate at which the cooling water flows through the radiator and bypass flow rate at which the cooling water flows through the bypass passage;

a water pump placed in the inlet or the outlet passage to circulate the cooling water through the internal combustion engine and the radiator;

a desired coolant temperature setting means for setting a normal desired coolant temperature of the cooling water flowing through the outlet passage; and

a coolant temperature control means for controlling temperature of the cooling water flowing through the outlet passage on the basis of the desired coolant temperature set by the desired coolant temperature setting means,

wherein the desired coolant temperature setting means changes the desired coolant temperature according to operating condition of the internal combustion engine, traveling condition of a vehicle mounted with the internal combustion engine, and ambient condition, and

wherein the desired coolant temperature setting means sets a desired coolant temperature for a transient traveling state differently from the normal desired coolant temperature when the vehicle is in the transient traveling state.

6. (Original) The internal combustion engine cooling system according to claim 5, wherein:

the desired coolant temperature setting means sets a desired coolant temperature for a steady traveling state differently from the normal desired coolant temperature when the vehicle is in the steady traveling state; and

the desired coolant temperature setting means sets the desired coolant temperature to be lower than the normal desired coolant temperature when the vehicle is in the transient traveling state.

7. (Currently amended) ~~The~~ An internal combustion engine cooling system according to claim 1 comprising:

a radiator that receives cooling water from an internal combustion engine, cools the cooling water and returns cooled cooling water into the internal combustion engine;

a coolant passage connecting the internal combustion engine and the radiator, and including an inlet passage through which the cooling water flows from the internal combustion engine into the radiator, and an outlet passage through which the cooling water flows from the radiator into the internal combustion engine;

a bypass passage connecting the inlet passage and the outlet passage to make the cooling water discharged from the internal combustion engine bypass the radiator;

a flow control valve placed at a junction of the outlet passage and the bypass passage to control radiator flow rate at which the cooling water flows through the radiator and bypass flow rate at which the cooling water flows through the bypass passage;

a water pump placed in the inlet or the outlet passage to circulate the cooling water through the internal combustion engine and the radiator;

a desired coolant temperature setting means for setting a normal desired coolant temperature of the cooling water flowing through the outlet passage; and

a coolant temperature control means for controlling temperature of the cooling water flowing through the outlet passage on the basis of the desired coolant temperature set by the desired coolant temperature setting means,

wherein the desired coolant temperature setting means changes the desired coolant temperature according to operating condition of the internal combustion engine, traveling condition of a vehicle mounted with the internal combustion engine, and ambient condition, and

wherein the desired coolant temperature setting means sets a desired coolant temperature differently from the normal desired coolant temperature according to altitude level as the ambient condition.

8. (Original) The internal combustion engine cooling system according to claim 7, wherein the desired coolant temperature setting means decreases the desired coolant temperature below the normal desired coolant temperature with the increase of altitude.

9. (Currently amended) ~~The~~ An internal combustion engine cooling system according to claim 1 comprising:

a radiator that receives cooling water from an internal combustion engine, cools the cooling water and returns cooled cooling water into the internal combustion engine;

a coolant passage connecting the internal combustion engine and the radiator, and including an inlet passage through which the cooling water flows from the internal combustion engine into the radiator, and an outlet passage through which the cooling water flows from the radiator into the internal combustion engine;

a bypass passage connecting the inlet passage and the outlet passage to make the cooling water discharged from the internal combustion engine bypass the radiator;

a flow control valve placed at a junction of the outlet passage and the bypass passage to control radiator flow rate at which the cooling water flows through the radiator and bypass flow rate at which the cooling water flows through the bypass passage;

a water pump placed in the inlet or the outlet passage to circulate the cooling water through the internal combustion engine and the radiator;

a desired coolant temperature setting means for setting a normal desired coolant temperature of the cooling water flowing through the outlet passage; and

a coolant temperature control means for controlling temperature of the cooling water flowing through the outlet passage on the basis of the desired coolant temperature set by the desired coolant temperature setting means,

wherein the desired coolant temperature setting means changes the desired coolant temperature according to operating condition of the internal combustion engine,

traveling condition of a vehicle mounted with the internal combustion engine, and ambient condition, and

wherein the desired coolant temperature setting means sets a desired coolant temperature differently from the normal desired coolant temperature according to humidity as the ambient condition.

10. (Original) The internal combustion engine cooling system according to claim 9, wherein the desired coolant temperature setting means increases the desired coolant temperature beyond the normal desired coolant temperature as the humidity increases.

11. (Currently amended) ~~The~~ An internal combustion engine cooling system according to claim 1 comprising:

a radiator that receives cooling water from an internal combustion engine, cools the cooling water and returns cooled cooling water into the internal combustion engine;

a coolant passage connecting the internal combustion engine and the radiator, and including an inlet passage through which the cooling water flows from the internal combustion engine into the radiator, and an outlet passage through which the cooling water flows from the radiator into the internal combustion engine;

a bypass passage connecting the inlet passage and the outlet passage to make the cooling water discharged from the internal combustion engine bypass the radiator;

a flow control valve placed at a junction of the outlet passage and the bypass passage to control radiator flow rate at which the cooling water flows through the radiator and bypass flow rate at which the cooling water flows through the bypass passage;

a water pump placed in the inlet or the outlet passage to circulate the cooling water through the internal combustion engine and the radiator;

a desired coolant temperature setting means for setting a normal desired coolant temperature of the cooling water flowing through the outlet passage; and

a coolant temperature control means for controlling temperature of the cooling water flowing through the outlet passage on the basis of the desired coolant temperature set by the desired coolant temperature setting means,

wherein the desired coolant temperature setting means changes the desired coolant temperature according to operating condition of the internal combustion engine, traveling condition of a vehicle mounted with the internal combustion engine, and ambient condition, and

wherein the desired coolant temperature setting means sets a desired coolant temperature differently from the normal desired coolant temperature according to intake temperature as the ambient condition.

12. (Original) The internal combustion engine cooling system according to claim 11, wherein the desired coolant temperature setting means decreases the desired coolant temperature below the normal desired coolant temperature as the intake temperature increases.

13. (Currently amended) ~~The~~An internal combustion engine cooling system according to claim 1 comprising:

a radiator that receives cooling water from an internal combustion engine, cools the cooling water and returns cooled cooling water into the internal combustion engine;

a coolant passage connecting the internal combustion engine and the radiator, and including an inlet passage through which the cooling water flows from the internal combustion engine into the radiator, and an outlet passage through which the cooling water flows from the radiator into the internal combustion engine;

a bypass passage connecting the inlet passage and the outlet passage to make the cooling water discharged from the internal combustion engine bypass the radiator;

a flow control valve placed at a junction of the outlet passage and the bypass passage to control radiator flow rate at which the cooling water flows through the

radiator and bypass flow rate at which the cooling water flows through the bypass passage;

a water pump placed in the inlet or the outlet passage to circulate the cooling water through the internal combustion engine and the radiator;

a desired coolant temperature setting means for setting a normal desired coolant temperature of the cooling water flowing through the outlet passage; and

a coolant temperature control means for controlling temperature of the cooling water flowing through the outlet passage on the basis of the desired coolant temperature set by the desired coolant temperature setting means,

wherein the desired coolant temperature setting means changes the desired coolant temperature according to operating condition of the internal combustion engine, traveling condition of a vehicle mounted with the internal combustion engine, and ambient condition, and

wherein the desired coolant temperature setting means sets a desired coolant temperature differently from the normal desired coolant temperature according to a combustion mode that is switched between a stratified-charge combustion mode and a uniform charge combustion mode in case the internal combustion engine is of a direct-injection type.

14. (Currently amended) The internal combustion engine cooling system according to claim 13, wherein the desired coolant temperature setting means sets the desired coolant temperature to be higher than the normal desired coolant temperature in the case of a of the stratified-charge combustion mode.

15. (Currently amended) ~~The~~ An internal combustion engine cooling system according to claim 1 comprising:

a radiator that receives cooling water from an internal combustion engine, cools the cooling water and returns cooled cooling water into the internal combustion engine;

a coolant passage connecting the internal combustion engine and the radiator, and including an inlet passage through which the cooling water flows from the internal combustion engine into the radiator, and an outlet passage through which the cooling water flows from the radiator into the internal combustion engine;

a bypass passage connecting the inlet passage and the outlet passage to make the cooling water discharged from the internal combustion engine bypass the radiator;

a flow control valve placed at a junction of the outlet passage and the bypass passage to control radiator flow rate at which the cooling water flows through the radiator and bypass flow rate at which the cooling water flows through the bypass passage;

a water pump placed in the inlet or the outlet passage to circulate the cooling water through the internal combustion engine and the radiator;

a desired coolant temperature setting means for setting a normal desired coolant temperature of the cooling water flowing through the outlet passage; and

a coolant temperature control means for controlling temperature of the cooling water flowing through the outlet passage on the basis of the desired coolant temperature set by the desired coolant temperature setting means,

wherein the desired coolant temperature setting means changes the desired coolant temperature according to operating condition of the internal combustion engine, traveling condition of a vehicle mounted with the internal combustion engine, and ambient condition, and

wherein the desired coolant temperature setting means sets a desired coolant temperature differently from a normal desired coolant temperature according to a combustion mode that is switched between a lean-burn mode and a stoichiometric combustion mode in case the internal combustion engine is of a lean-burn type.

16. (Currently amended) The internal combustion engine cooling system according to claim 15, wherein the desired coolant temperature setting means sets a desired coolant temperature to be higher than the normal desired coolant temperature

~~for a~~ for the stoichiometric combustion mode when the lean-burn internal combustion engine is operating in a lean-burn combustion mode.

Claims 17-23 (Canceled).